

1 **CLAIMS**

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3 1. A design tool comprising:

4 a service definition model to enable abstract description of distributed

5 computing systems and distributed applications; and

6 a schema to dictate how functional operations within the service definition

7 model are to be specified, wherein the functional operations include design of

8 distributed applications, deployment of distributed applications, and management

9 of distributed applications.

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11 2. A method comprising:

12 hosting an implementation of a distributed system architected using a

13 service definition model (SDM);

14 exposing a set APIs for manipulating an SDM type; and

15 tracking SDM instances for deployment and management of distributed

16 applications.

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18 3. The method of claim 2 further comprising tracking SDM instances

19 for design time validation.

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21 4. The method of claim 2 further comprising designing distributed

22 applications on the distributed system.

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1           5.    The method of claim 2 further comprising designing distributed  
2 applications on the distributed system using the service definition model.

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4           6.    A method comprising facilitating design of a scale-invariant virtual  
5 data center representative of a physical data center by describing the physical data  
6 center according to a service definition model, wherein the service definition  
7 model includes services associated with designing distributed applications,  
8 services associated with deploying distributed applications, and services  
9 associated with managing distributed applications.

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11          7.    The method of claim 6 wherein the virtual data center is supported by  
12 a first data center and a second data center such that an application can be  
13 deployed into either the first data center or the second data center without  
14 requiring changes in the logical model mapping between the application parts and  
15 the virtual data center parts.

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17          8.    The method of claim 6 further comprising:  
18               determining a number of instances to be created for a particular logical  
19 component of the physical data center; and  
20               determining a wiring topology to implement the physical data center.

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22          9.    The method of claim 6 further comprising automatically deploying  
23 physical resources and a distributed application.

1           **10.**    The method of claim 6 further comprising managing a distributed  
2 application on the physical data center using a model-based management  
3 approach.

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5           **11.**    The method of claim 6 wherein the physical data center includes an  
6 operations engine for orchestrating a sequence of operations tasks in response to a  
7 triggering event.

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9           **12.**    The method of claim 11 wherein the triggering event is annotated  
10 with application context from the service definition model.

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12           **13.**    The method of claim 11 wherein the sequence of operations tasks  
13 includes deploying a new resource using a resource management system.

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15           **14.**    A method comprising:  
16           facilitating design of a virtual data center and a distributed application;  
17           logically placing parts of the distributed application onto the virtual data  
18 center; and  
19           implementing a physical data center based on the virtual data center.

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21           **15.**    The method of claim 14 wherein when logically placing parts of the  
22 distributed application into the virtual data center, an operator's view of the virtual  
23 data center is restricted to contain only those parts relevant to the placement of the  
24 distributed application.

1           **16.**     The method of claim 14 in which the virtual data center comprises a  
2 plurality of service definition model layers such that each layer is logically placed  
3 onto the layer beneath it.

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5           **17.**     The method of claim 14 further comprising allocating resources of  
6 the virtual data center to support the distributed application.

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8           **18.**     A method comprising:  
9           facilitating design of a virtual data center and a distributed application;  
10          logically placing parts of the distributed application onto the virtual data  
11 center; and  
12          determining whether the placement of the parts of the distributed  
13 application is valid.

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15          **19.**     The method of claim 18 further comprising generating a warning  
16 message if the placement of the parts of the distributed application is not valid.

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18          **20.**     The method of claim 18 further comprising implementing a physical  
19 data center based on the virtual data center.

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21          **21.**     The method of claim 18 further comprising allocating resources of  
22 the virtual data center to support the distributed application.

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2       **22.**    A software architecture for use in designing, deploying, and  
3 managing distributed applications on a distributed computing system, the software  
4 architecture comprising:

5           a first software layer for tools used to convert machines into servers used in  
6 the distributed computing system;

7           a second software layer for network management and virtual topology  
8 generation of distributed applications;

9           a third software layer to maintain a physical model of the distributed  
10 computing system;

11          a fourth software layer to facilitate allocation of logical resources requested  
12 by the distributed application;

13          a fifth software layer for a service definition model (SDM) that provides a  
14 namespace and context for describing operations processes and an API for  
15 application introspection and control of application resources; and

16          a sixth software layer to define reusable building blocks of a distributed  
17 application, which use the SDM APIs for context, naming, and binding; and

18          a seventh software layer for operational management of the distributed  
19 application.  
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2       **23.**     A resource manager comprising:  
3       means for allocating resources within a distributed computing system;  
4       means for discovering available hardware;  
5       means for processing resource allocation requests;  
6       means for tracking ownership of resources;  
7       means for controlling resources; and  
8       means for providing a common API for all resource management within the  
9       distributed computing system.

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11       **24.**     The resource manager of claim 23 wherein the means for allocating  
12       resources is configured to allocate logical resources and physical resources within  
13       the distributed computing system.

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15       **25.**     The resource manager of claim 23 further comprising means for  
16       managing a distributed application on the distributed computing system.

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18       **26.**     The resource manager of claim 23 wherein the means for controlling  
19       resources is configured to orchestrate a sequence of operations tasks in response to  
20       an event.